NON-PUBLIC?: N
ACCESSION #: 9011070028
LICENSEE EVENT REPORT (LER)

FACILITY NAME: South Texas, Unit 1 PAGE: 1 OF 05

DOCKET NUMBER: 05000498

TITLE: Manual Reactor Trip Due to Full Closure of a Feedwater Isolation Valve During Partial Stroke Testing
EVENT DATE: 09/29/90 LER #: 90-023-00 REPORT DATE: 10/29/90

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: C. A. Ayala - Supervising Licensing Engineer TELEPHONE: (512) 972-8628

COMPONENT FAILURE DESCRIPTION:
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On September 29, 1990, Unit 1 was in Mode 1 at 100% power. At 0232 hours, Feedwater Isolation Valve 1A fully closed during an "alternate" partial stroke surveillance test. The resultant loss of feedwater flow caused a decrease in steam generator level and the reactor was manually tripped. During recovery, a Steam Generator Power Operated Relief Valve (PORV) was manually opened to approximately 30% while indicating approximately 5% open. At 0345 hours, an Auxiliary Feedwater (AFW) actuation occurred on low-low Steam Generator (SG) level. The SG PORV was closed, and the plant was stabilized. The Feedwater Isolation Valve closure was caused by a technician inadvertently contacting the wrong terminal with a test jumper. The cause of the AFW actuation during recovery was failure of a Reactor Operator to confirm the position of the SG PORV by monitoring SG level and pressure indications when the Valve Position Indicator displayed some uncertainty. Corrective actions

include: addition of special connectors on the terminals identified in the "alternate" partial stroke test procedure; the use of special insulated jumpers during performance of the stroke test; performance of the partial stroke test on a monthly basis vice weekly; development of a training module emphasizing the importance of attention to detail of self verification which was presented to employees engaged in operations and maintenance of the plant.

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END OF ABSTRACT

DESCRIPTION OF EVENT:

On September 29, 1990, Unit 1 was in Mode 1 at 100% power. At 0232 hours, Feedwater Isolation Valve (FWIV) 1A fully closed during performance of a partial stroke surveillance test. Steam Generator (SG) 1A level began decreasing and the reactor was manually tripped since an automatic reactor trip was imminent due to low steam generator water level. The turbine tripped, Feedwater Isolation occurred on low Reactor Coolant System (RCS) average temperature, and Auxiliary Feedwater (AFW) flow initiated on low-low steam generator level as expected. During recovery, the Main Steam Isolation Valves (MSIV) were manually closed to limit the cooldown. Manual control was used to maintain RCS temperature. The SG 1C Power Operated Relief Valve (PORV) was manually opened to approximately 30% while indicating approximately 5% open. At 0345 hours, the AFW system actuated on a low-low steam generator level signal on SG 1C. The SG 1C PORV was closed, and the plant was stabilized. The NRC was notified at 0518 hours.

The FWIVs are hydraulically operated with a nitrogen charge in the upper cylinder. The valve is closed by opening one or both of two solenoid valves in parallel which dumps hydraulic fluid back to a reservoir; this allows the nitrogen charge to drive the valve closed. The partial stroke test verifies that both solenoids open and the FWIV closes to the 90% position. Solenoid position is sensed by reed switches connected to the test circuitry. The solenoids and reed switches are located within the valve yoke and are difficult to maintain at power. If a reed switch is not functioning correctly, as was the case with FWIV 1A, an "alternate" partial stroke test procedure using jumpers is employed which allows testing each solenoid individually.

Prior to the event, a utility maintenance technician installed a jumper on the insulated portion of the wires adjacent to the terminals specified

in the "alternate" partial stroke test procedure. This was done as a precaution so that a licensed operator could verify that the technician had identified the correct terminals prior to actually connecting the jumper. The licensed operator verified that the selected terminals were correct. The technician then proceeded, connecting one end of the jumper correctly. As he prepared to connect the other end he was momentarily distracted and contacted an adjacent terminal, causing FWIV 1A to close.

During the post-trip recovery process, the SG PORV's were used to maintain RCS temperature. At approximately 0342 hours, a Reactor Operator (RO) manually opened SG 1C PORV from the control room panel. The PORV appeared to respond sluggishly when opening the valve. The Valve Position Indicator (VPI) read approximately 5% open. The RO atte
pted to position the SG 1C PORV to 10% open. The VPI remained at 5% open. The RO decided that the indicated position of 5% open was sufficient to maintain RCS temperature; however, the SG 1C PORV was actually approximately 30% open.

DESCRIPTION OF EVENT: (cont'd)

Immediately following the valve manipulation an on-coming RO arrived and conducted turnover with the on-duty RO responsible for control of RCS temperature. At 0345 hours, an AFW actuation occurred on low-low steam generator level on SG 1C. The SG 1C PORV now indicated approximately 30% open and was subsequently closed.

CAUSE OF EVENT:

The direct cause of the manual reactor trip was a failed-closed feedwater isolation valve. The failed-closed feedwater isolation valve was caused by a technician inadvertently contacting the wrong terminal with a test jumper. Additional contributing factors are that the FWIV's solenoid valve reed switches were not functioning, and the design is such that they are difficult to maintain at power. With the reed switches not functioning, a successful partial stroke test could not be performed without the use of jumpers.

The cause of the AFW actuation during recovery was failure of the RO to confirm the position of the Steam Generator PORV by monitoring other parameters such as SG 1C level and pressure indications when the Valve Position Indicator displayed some uncertainty. A contributing factor was

that the RO conducted turnover which distracted him during a task which required operator attention.

ANALYSIS OF EVENT:

Reactor Protection System and Engineered Safety Features actuations are reportable pursuant to 10CFR50.73.(a)(2)(iv). All safety systems responded as expected. This event did not result in any adverse safety or radiological concerns nor did it threaten the safety of the public at any time.

CORRECTIVE ACTION:

The following corrective actions are being taken as a result of this event:

1) Special connectors were installed on the terminations in the Unit 1 auxiliary relay cabinets which are specified in the FWIV "alternate" partial stroke test procedure. The connectors provide a visual identifier of the correct terminations. The design also provides for use of an insulated jumper. The modification will be completed in the Unit 2 auxiliary relay cabinets by the end of the current refueling outage.

2) The FWIV "alternate" partial stroke test procedures for both units will be revised to require use of the special insulated jumper. This will be completed by November 5, 1990.

3) The FWIV partial stroke test is normally performed quarterly per Technical Specifications. The test frequency was revised to require weekly testing as a result of a 10CFR21 report regarding FWIV solenoid dump valve failure to energize due to thermal incompability of hydraulic fluid, submitted to the NRC under HL&P letter number ST-HL-AE-3430 dated April 11, 1990. A revised 10CFR21 report was submitted to the NRC under HL&P letter number ST-HL-AE-3568 dated October 15, 1990 which reduced the frequency of the test to monthly.

4) A review of partial stroke surveillance test procedures as well as other surveillance procedures that use jumpers was in progress to develop enhancements that can minimize the potential for reactor trips or Engineered Safety Features

actuations as a result of LER 90-006 (Unit 1). This review will be completed by December 7, 1990.

5) A modification to remove the FWIV solenoid dump valves and reed switches from the yoke of the feedwater isolation valves is currently scheduled to be implemented during the fourth refueling outage on Unit 1 and the second refueling outage on Unit 2. This will help minimize maintenance problems with these components which will minimize need for performance of the "alternate" partial stroke test and use of jumpers.

6) The Reactor Operator was counseled on the need to verify an expected response by monitoring the associated parameters.

7) The SG PORV valve position indicator was found to be sticking and replaced. Post maintenance testing was performed satisfactorily.

8) A training module emphasizing the importance of attention to detail and self verification was developed and training was conducted for employees engaged in the maintenance and operation of the plant. The training will be conducted site wide by December 15, 1990. A plan of action is being developed for additional training and monitoring of station work practices.

ADDITIONAL INFORMATION:

There has been one previously reported event, LER 90-006 (Unit 1), concerning a reactor trip due to full closure of a FWIV during partial stroke testing.

The Light
company P.O. Box 1700 Houston, Texas 77001 (713) 228-9211

Houston Lighting & Power
October 29, 1990
ST-HL-AE-3603
File No.: G26
10CFR50.73

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

South Texas Project Electric Generating Station
Unit 1
Docket No. STN 50-498
Licensee Event Report 90-023 Regarding
a Manual Reactor Trip Due to Full Closure of a
Feedwater Isolation Valve During Partial Stroke Testing

Pursuant to 10CFR50.73, Houston Lighting & Power Company (HL&P) submits the attached Licensee Event Report (LER 90-023) regarding a manual reactor trip due to full closure of a feedwater isolation valve during partial stroke testing. This event did not have any adverse impact on the health and safety of the public.

If you should have any questions on this matter, please contact Mr. C. A. Ayala at (512) 972-8628 or myself at (512) 972-8530.

M. A. McBurnett
Manager
Nuclear Licensing

RAD/sgs

Attachment: LER 90-023 (South Texas, Unit 1)

A1/LER023U1.L01 A Subsidiary of Houston Industries Incorporated

cc:

Regional Administrator, Region IV Rufus S. Scott
Nuclear Regulatory Commission Associate General Counsel
611 Ryan Plaza Drive, Suite 1000 Houston Lighting & Power Company
Arlington, TX 76011 P. O. Box 61867
Houston, TX 77208
George Dick, Project Manager
U.S. Nuclear Regulatory Commission INPO

Washington, DC 20555 Records Center
1100 Circle 75 Parkway
J. I. Tapia Atlanta, GA 30339-3064
Senior Resident Inspector
c/o U. S. Nuclear Regulatory Dr. Joseph M. Hendrie
Commission 50 Bellport Lane
P. O. Box 910 Bellport, NY 11713
Bay City, TX 77414
D. K. Lacker
J. R. Newman, Esquire Bureau of Radiation Control
Newman & Holtzinger, P.C. Texas Department of Health
1615 L Street, N.W. 1100 West 49th Street
Washington, DC 20036 Austin, TX 78756-3189

R. P. Verret/D. E. Ward
Central Power & Light Company
P. O. Box 2121
Corpus Christi, TX 78403

J. C. Lanier/M. B. Lee
City of Austin
Electric Utility Department
P.O. Box 1088
Austin, TX 78767

R. J. Costello/M. T. Hardt
City Public Service Board
P. O. Box 1771
San Antonio, TX 78296

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L4/NRC/

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